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SPECIAL FLOOD HAZARD EVALUATION REPORT KELSEY AND COLD  
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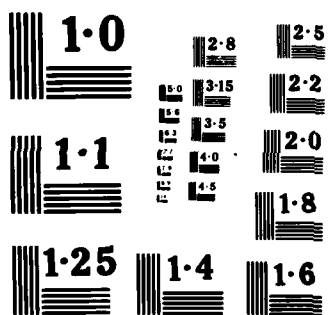
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# Special Flood Hazard Evaluation Report

AD-A159 929

## Kelsey and Cold Creeks

City of Watertown  
Town of Watertown  
Town of Pamela  
Jefferson County  
New York

Prepared for  
the New York State  
Department of Environmental Conservation

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO. AD-A159 929	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Special Flood Hazard Evaluation Report Kelsey and Cold Creeks City and Town of Watertown and Town of Pamela, Jefferson County, NY		5. TYPE OF REPORT & PERIOD COVERED Special Flood Hazard Evaluation Report
7. AUTHOR(s)		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Army Corps of Engineers Buffalo District 1776 Niagara Street Buffalo, NY 14207		8. CONTRACT OR GRANT NUMBER(s)  N/A
11. CONTROLLING OFFICE NAME AND ADDRESS		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE July 1985
		13. NUMBER OF PAGES 11 pgs. 5 plates
		15. SECURITY CLASS. (of this report)
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report)  <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> This document has been approved for public release and sale; its distribution is unlimited. </div>		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number)  Kelsey Creek and Cold Creek, Watertown and Pamela, N.Y., flood plain management, history of flooding, flood profiles, flooded areas.		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This special flood hazard evaluation report investigates the potential flood situation along Kelsey Creek from the confluence with the Black River in the city of Watertown upstream to the U.S. Route 11 culvert in the town of Pamela, and Cold Creek from the confluence with the Black River in the town of Watertown upstream for about 1.3 miles. Although floods have occurred, studies indicate that even larger floods are possible. This report includes a history of flooding along Kelsey and Cold Creeks. It identifies those areas		

20. that are subject to possible future floods. Special emphasis is given to those floods through the use of maps and water surface profiles. The report furnishes a suitable basis for the adoption of land use controls to guide flood plain development and thereby prevents intensification of the flood loss problem. It will also aid in the development of other flood damage reductions techniques to modify flooding and reduce flood damages which might be embodied in an overall flood plain management program. Other types of studies, such as those of environmental attributes and the current and future land use role of the flood plain as part of its surroundings, would also profit from this information.

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SPECIAL FLOOD HAZARD  
EVALUATION REPORT

KELSEY AND COLD CREEKS  
CITY AND TOWN OF WATERTOWN AND TOWN OF PAMELIA  
JEFFERSON COUNTY, NEW YORK

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## **SPECIAL FLOOD HAZARD EVALUATION REPORT**

### **KELSEY AND COLD CREEKS CITY AND TOWN OF WATERTOWN AND TOWN OF PAMELIA JEFFERSON COUNTY, NEW YORK**

#### **INTRODUCTION**

This Special Flood Hazard Evaluation Report was prepared at the request of the New York State Department of Environmental Conservation. It investigates the potential flood situation along Kelsey Creek from the confluence with the Black River in the city of Watertown upstream to the U.S. Route 11 culvert in the town of Pamela, and Cold Creek from the confluence with the Black River in the town of Watertown upstream for about 1.3 miles. Although floods have occurred, studies indicate that even larger floods are possible.

Knowledge of potential floods and flood hazards is important in land use planning. This report includes a history of flooding along Kelsey and Cold Creeks and identifies those areas that are subject to possible future floods. Special emphasis is given to those floods through the use of maps and water surface profiles. While the report does not provide solutions to flood problems, it does furnish a suitable basis for the adoption of land use controls to guide flood plain development and thereby prevents intensification of the flood loss problem. It will also aid in the development of other flood damage reduction techniques to modify flooding and reduce flood damages which might be embodied in an overall Flood Plain Management (FPM) program. Other types of studies, such as those of environmental attributes and the current and future land use role of the flood plain as part of its surroundings, would also profit from this information.

Additional copies of this report can be obtained from the New York State Department of Environmental Conservation until its supply is exhausted and the National Technical Information Service of the U.S. Department of Commerce, Springfield, VA 22161, at the cost of reproducing the report. The Buffalo District Corps of Engineers will provide technical assistance and guidance to planning agencies in the interpretation and use of the data.

#### **PAST FLOODS**

Kelsey and Cold Creeks do flood over their banks occasionally. The most recent flooding was in February 1985 along Kelsey Creek and Cold Creek. The problem area along Kelsey Creek is from the confluence of the Black River upstream for about a mile. About 70 homes and several businesses in this urban area have been flooded in the past. Cold Creek floods more often, but the damages and businesses are less than along Kelsey Creek. The flooding along both streams occurs because of rather small channel capacities. The undersized culvert at the high railroad embankment near the mouth of Kelsey Creek also affects flood heights upstream from the railroad.



## FUTURE FLOODS

Floods of the same or larger magnitude as those that have occurred in the past are likely to occur in the future. Floods larger than those on the two creeks have been experienced in the past on streams with similar geographical and physiographical characteristics as those found in the study area. Similar combinations of rainfall and runoff which caused these floods could occur within the study area. To assess the flooding potential of the study area, it is necessary to consider storms and floods that have occurred in regions with the same topography, watershed cover, and physical characteristics.

### Flood Magnitudes and Their Frequencies

Floods are classified on the basis of their frequency or return period. A 100-year flood is an event whose magnitude can be expected to be exceeded on the average of once every hundred years. The 100-year event has a 1 percent chance of exceedence in any given year. It is important to note that, while on a long-term basis the exceedence averages out to once per hundred years, floods of this magnitude can occur in any given year or even in consecutive years and within any given time interval.

Similarly, the 10, 50, and 500-year flood events are those floods whose magnitudes can, in the long term, be expected to be exceeded on the average of once in every 10, 50, or 500 years.

It should be noted that there is a greater than 50 percent probability that a 100-year flood event will occur during a 70-year lifetime. Additionally, a house which is built at the 100-year flood level has about a one in four chance of being flooded in a 30-year mortgage life.

A 500-year frequency flood is defined as a flood having an average frequency of exceedence in the order of once in 500 years at a designated location, or a flood having a 0.2 percent chance of exceedence in any given year. A flood of this magnitude can be catastrophic, especially when it occurs in developed stream valleys.

Peak discharge-frequency relationships for various floods were determined at several locations along Kelsey Creek and Cold Creek. Tables 1 and 2 are summaries of peak discharges for three recurrence intervals (in years) along each stream.

Table 1 - Peak Flows on Kelsey Creek

Location	Drainage Area (sq. mi.)	10-Year Discharge (cfs)	100-Year Discharge (cfs)	500-Year Discharge (cfs)
At Mouth	7.88	640	1,070	1,290
Upstream from Tributary at Sta.: 35+20		580	970	1,130
Upstream from Railroad Culvert at Sta. 50+70	7.20	690	1,270	1,680
Upstream from Tributary at Sta.: 63+50		600	1,110	1,490
Upstream from Tributary at Sta.: 86+20	4.63	510	950	1,300

Table 2 - Peak Flows on Cold Creek

Location	Drainage Area (sq. mi.)	10-Year Discharge (cfs)	100-Year Discharge (cfs)	500-Year Discharge (cfs)
At Mouth	3.35	220	400	515
Upstream from Abandoned Rail- road Culvert at Sta. 4+90		330	600	840
Upstream from Tributary at Sta.: 6+25		320	585	820
Upstream from Tributary at Sta.: 57+50	1.21	160	300	430

#### Hazards and Damages of Large Floods

The extent of damage caused by any flood depends on the topography of the flooded area, the depth and duration of flooding, the velocity of flow, the rate of rise in water surface elevation, and development of the flood plain.

Deep water flowing at a high velocity and carrying floating debris would create conditions hazardous to persons and vehicles which attempt to cross the flood plain. Generally, water 3 or more feet deep which flows at a velocity of 3 or more feet per second could easily sweep an adult off his feet and create definite danger of injury or drowning. Rapidly rising and swiftly flowing floodwater may trap persons in homes that are ultimately destroyed or in vehicles that are ultimately submerged or floated. Since waterlines can be ruptured by deposits of debris and by the force of flood waters, there is the possibility of contaminated domestic water supplies. Damaged sanitary sewer lines and sewage treatment plants could result in pollution by floodwaters and could create health hazards. Isolation of areas by floodwater could create hazards in terms of medical, fire, or law enforcement emergencies.

#### Flood Profiles and Flooded Areas

Analyses of the hydraulic characteristics of Kelsey and Cold Creeks were carried out to provide estimates of the elevations of the floods of the selected recurrence intervals. Cross-sectional data for the creek were obtained by field survey in October 1984. Bridges were surveyed to obtain elevation data and structural geometry.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Plates 1, 2, and 3). Selected cross-section locations are also shown on the Flooded Area Maps (Plates 4, and 5).

The flood profiles were generated using the HEC-2 backwater program (Reference 1). Water surface profile computations along Kelsey Creek were started using a 2-year water level on the Black River that could be expected once every 2 years. Critical depth was assumed for the starting water surface elevation along Cold Creek. Manning's "n" values used are 0.040 to 0.080 for channel and 0.050 to 0.100 for overbank areas for Kelsey Creek, and 0.040 to 0.090 and 0.05 to 0.10 for Cold Creek, respectively. From field observations roughness coefficients were selected according to channel conditions, brush in overbank areas, presence of roads, parking lots and lawns, and other factors. Contraction and expansion coefficients of 0.2-0.4 and 0.3-0.5, respectively for both creeks, were used in these computations. Water surface profiles were computed for several frequency flows listed in Tables 1 and 2. Profiles were drawn showing computed water surface elevations for floods of the selected recurrence intervals. The 10,100, and 500-year floods are shown on the profiles.

The hydraulic analyses for this study are based only on the effects of unobstructed flow. The flood elevations as shown on the profiles are, therefore, considered valid only if the bridges across the creeks remain unobstructed from debris or ice and if channel and overbank conditions remain essentially the same as ascertained during this study.

The areas that would be inundated by the 100-year and 500-year discharges are shown on the Flooded Area Maps. The actual limits of these overflow areas may vary somewhat from those shown on the maps because the scale of the maps

and contour intervals do not permit precise plotting of the boundaries of the flooded area. Therefore, the profile elevations should be used to determine the flood elevations at a particular location along the stream.

All elevations are referenced from National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in the study are shown in Table 2.

Table 3 - Elevation Reference Marks in the Study Area

		: Elevation :	
		: in Feet :	
Reference Mark	:	(NGVD) (1):	Description of Location
<hr/>			
Kelsey Creek			
<hr/>			
1	:	389.63	: Top of pier on upstream side of Cayuga Avenue
	:		: Bridge.
2	:	396.55	: Top of sidewalk at base of concrete railing
	:		: support on the downstream side and southwest
	:		: corner of Bradley Street Bridge.
3	:	405.84	: Top of southeast abutment on downstream side of
	:		: Route 37 Bridge.
<hr/>			
Cold Creek			
<hr/>			
4	:	501.68	: Top of downstream end of 9-foot dia. corrugated
	:		: metal pipe at Huntington Street culvert.
5	:	509.17	: Top of highway post, 7 feet north of centerline
	:		: of downstream headwall at Hunt Street culvert.
6	:	511.47	: Top of downstream headwall at east side of
	:		: State Street culvert.
<hr/>			

(1) Approximate location of the elevation reference marks are shown on the flooded area maps.

#### Obstructions

During floods, debris collecting on bridges could decrease their flow-carrying capacity and cause greater water depths (backwater effect) upstream of these structures. Since the occurrence and amount of debris are indeterminate factors, only the physical characteristics of the structures were considered in preparing the profiles. No reduction in the carrying capacity from clogging or jamming was considered. Similarly, maps of the flooded area show the backwater effect of constricted bridge openings, but do not reflect increased water surface elevations that could be caused by debris or ice collecting against the structures.

## UNIFIED FLOOD PLAIN MANAGEMENT

Historically, the alleviation of flood damage has been accomplished almost exclusively by the construction of protective works such as reservoirs, channel improvements, and floodwalls and levees. However, in spite of the billions of dollars that have already been spent for construction of well-designed and efficient flood control works, annual flood damages continue to increase because the number of persons and structures occupying floodprone lands is increasing faster than protective works can be provided.

Recognition of this trend in recent years has forced a reassessment of the flood control concept and resulted in the broadened concept of unified flood plain management programs. Legislative and administrative policies frequently cite two approaches: structural and nonstructural, for adjusting to the flood hazard. In this context, "structural" is usually intended to mean adjustments that modify the behavior of floodwaters through the use of measures such as public works' dams and channel work. "Nonstructural" is usually intended to include all other adjustments in the way society acts when occupying or modifying a flood plain (e.g., regulations, floodproofing, insurance, etc.). Both structural and nonstructural tools are used for achieving desired future flood plain conditions. There are three basic strategies which may be applied individually or in combination: (1) modifying the susceptibility to flood damage and disruption, (2) modifying the floods themselves, and (3) modifying (reducing) the adverse impacts of floods on the individual and the community.

### Modify Susceptibility to Flood Damage and Disruption

The strategy to modify susceptibility to flood damage and disruption consists of actions to avoid dangerous, economically undesirable, or unwise use of the flood plain. Responsibility for implementing such actions rests largely with the non-Federal sector and primarily at the local level of Government.

These actions include restrictions in the mode and the time of occupancy; in the ways and means of access; in the pattern, density, and elevation of structures and in the character of their materials (structural strength, absorptiveness, solubility, corrodibility); in the shape and type of buildings and in their contents; and in the appurtenant facilities and landscaping of the grounds. The strategy may also necessitate changes in the interdependencies between flood plains and surrounding areas not subject to flooding, especially interdependencies regarding utilities and commerce. Implementing mechanisms for these actions include land use regulations, development and redevelopment policies, floodproofing, disaster preparedness and response plans, and flood forecasting and warning systems. Different tools may be more suitable for developed or underdeveloped flood plains or to urban or rural areas. The information contained in this report is particularly useful for the preparation of flood plain regulations.

#### a. Flood Plain Regulations.

Flood plain regulations apply to the full range of ordinances and other means designed to control land use and construction within floodprone areas.

The term encompasses zoning ordinances, subdivision regulations, building and housing codes, encroachment line statutes, open area regulations, and other similar methods of management which affect the use and development of floodprone areas.

Flood plain land use management does not prohibit use of floodprone areas; to the contrary, flood plain land use management seeks the best use of flood plain lands. The flooded area maps and the water surface profiles contained in this report can be used to guide development in the flood plain. The elevations shown on the profiles should be used to determine flood heights because they are more accurate than the outlines of flooded areas. Development in areas susceptible to frequent flooding should consist of construction which has a low damage potential such as parking areas and golf courses. If high value construction such as buildings are considered for areas subject to frequent flooding, the land should be elevated to minimize damages. If it is uneconomical to elevate the land in these areas, means of floodproofing the structures should be given careful consideration.

#### b. Formulation of Flood Plain Regulations

Formulation of flood plain regulations in a simplified sense involves selecting the type and degree of control to be exercised for each specific flood plain. In principal, the form of the regulations is not as important as a maintained adequacy of control. The degree of control normally varies with the flood hazard as measured by depth of inundation, velocity of flow, frequency of flooding, and the need for available land. Considerable planning and research is required for the proper formulation of flood plain regulations. Where formulation of flood plain regulations is envisioned to require a lengthy period of time during which development is likely to occur, temporary regulations should be adopted to be amended later as necessary.

#### Modify Flooding

The traditional strategy of modifying floods through the construction of dams, dikes, levees, and floodwalls, channel alterations, high flow diversions and spillways, and land treatment measures has repeatedly demonstrated its effectiveness for protecting property and saving lives, and it will continue to be a strategy of flood plain management. However, in the future, reliance solely upon a flood modification strategy is neither possible nor desirable. Although the large capital investment required by flood modifying tools has been provided largely by the Federal Government, sufficient funds from Federal sources have not been, and are not likely to be available to meet all situations for which flood modifying measures would be both effective and economically feasible. Another consideration is that the cost of maintaining and operating flood control structures fall upon local governments except for major Federal reservoirs with flood control storage.

Flood modifications acting alone leave a residual flood loss potential and can encourage an unwarranted sense of security leading to inappropriate use of lands in the areas that are directly protected or in adjacent areas. For this reason, measures to modify possible floods should usually be accompanied

by measures to modify the susceptibility to flood damage, particularly by land use regulations.

Flood modifying tools permit changes in the volume of runoff, in the peak stage of the flood, in the time of rise and duration, in the extent of the area flooded, in the velocity and depth of floodwaters, and consequently in the amount of debris, sediment, and pollutants that floods carry.

#### Modify the Impact of Flooding on Individuals and the Community

A third strategy for mitigating flood losses consists of actions designed to assist individuals and communities in their preparatory, survival, and recovery responses to floods. Tools include information dissemination and education, arrangements for spreading the costs of the loss over time, and transfer of some of the individual's loss to the community by reducing taxes on flood prone areas.

The distinction between a reasonable and unreasonable transfer of costs from the individual to the community can also be regulated and is a key to effective flood plain management.

#### CONCLUSIONS

This report presents local flood hazard information for Kelsey Creek and Cold Creek in the city and town of Watertown, and the town of Pamela. The U.S. Army Corps of Engineers, Buffalo District, will provide interpretation and limited technical assistance in the application of the data contained in this report, particularly as to its use in developing effective flood plain regulations. Requests should be coordinated through the New York State Department of Environmental Conservation.

## GLOSSARY

BACKWATER	The resulting high water surface in a given stream due to a downstream obstruction or high stages in an intersecting stream.
BASE FLOOD	A flood which has an average return interval in the order of once in 100 years, although the flood may occur in any year. It is based on statistical analysis of streamflow records available for the watershed and analysis of rainfall and runoff characteristics in the general region of the watershed. It is commonly referred to as the "100-year flood."
DISCHARGE	The quantity of flow in a stream at any given time, usually measured in cubic feet per second (cfs).
FLOOD	<p>An overflow of lands not normally covered by water. Floods have two essential characteristics: The inundation of land is temporary and the lands are adjacent to and inundated by overflow from a river, stream, ocean, lake, or other body of standing water.</p> <p>Normally a "flood" is considered as any temporary rise in streamflow or stage, but not the ponding of surface water that results in significant adverse effects in the vicinity. Adverse effects may include damages from overflow of land areas, temporary backwater effects in sewers and local drainage channels, creation of unsanitary conditions or other unfavorable situations by deposition of materials in stream channels during flood recessions, and rise of groundwater coincident with increased streamflow.</p>
FLOOD CREST	The maximum stage or elevation reached by floodwaters at a given location.
FLOOD FREQUENCY	A statistical expression of the percent chance of exceeding a discharge of a given magnitude in any given year. For example, a <u>100-year flood</u> has a magnitude expected to be exceeded on the average of once every hundred years. Such a <u>flood</u> has a 1 percent chance of being exceeded in any given year. Often used interchangeably with <u>RECURRENCE INTERVAL</u> .
FLOOD PLAIN	The areas adjoining a river, stream, watercourse, ocean, lake, or other body of standing water that have been or may be covered by floodwater.



**FLOOD PROFILE**

A graph showing the relationship of water surface elevation to location; the latter generally expressed as distance upstream from mouth for a stream of water that flows in an open channel. It is generally drawn to show surface elevation for the crest of a specific flood, but may be prepared for conditions at a given time or stage.

**FLOOD STAGE**

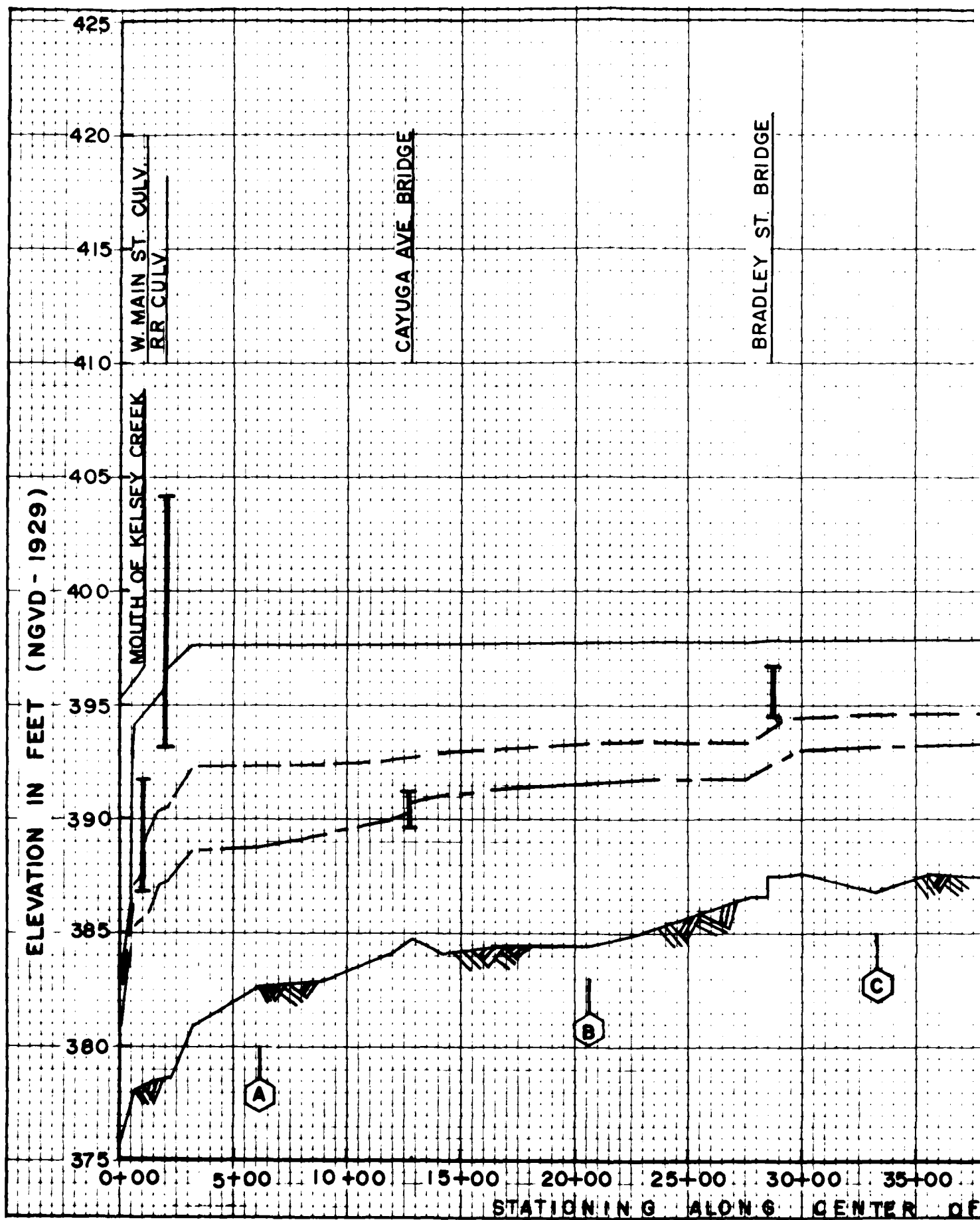
The stage or elevation at which overflow of the natural banks of a stream or body of water begins in the reach or area in which the elevation is measured.

**RECURRENCE INTERVAL**

A statistical expression of the average time between floods exceeding a given magnitude (see FLOOD FREQUENCY).





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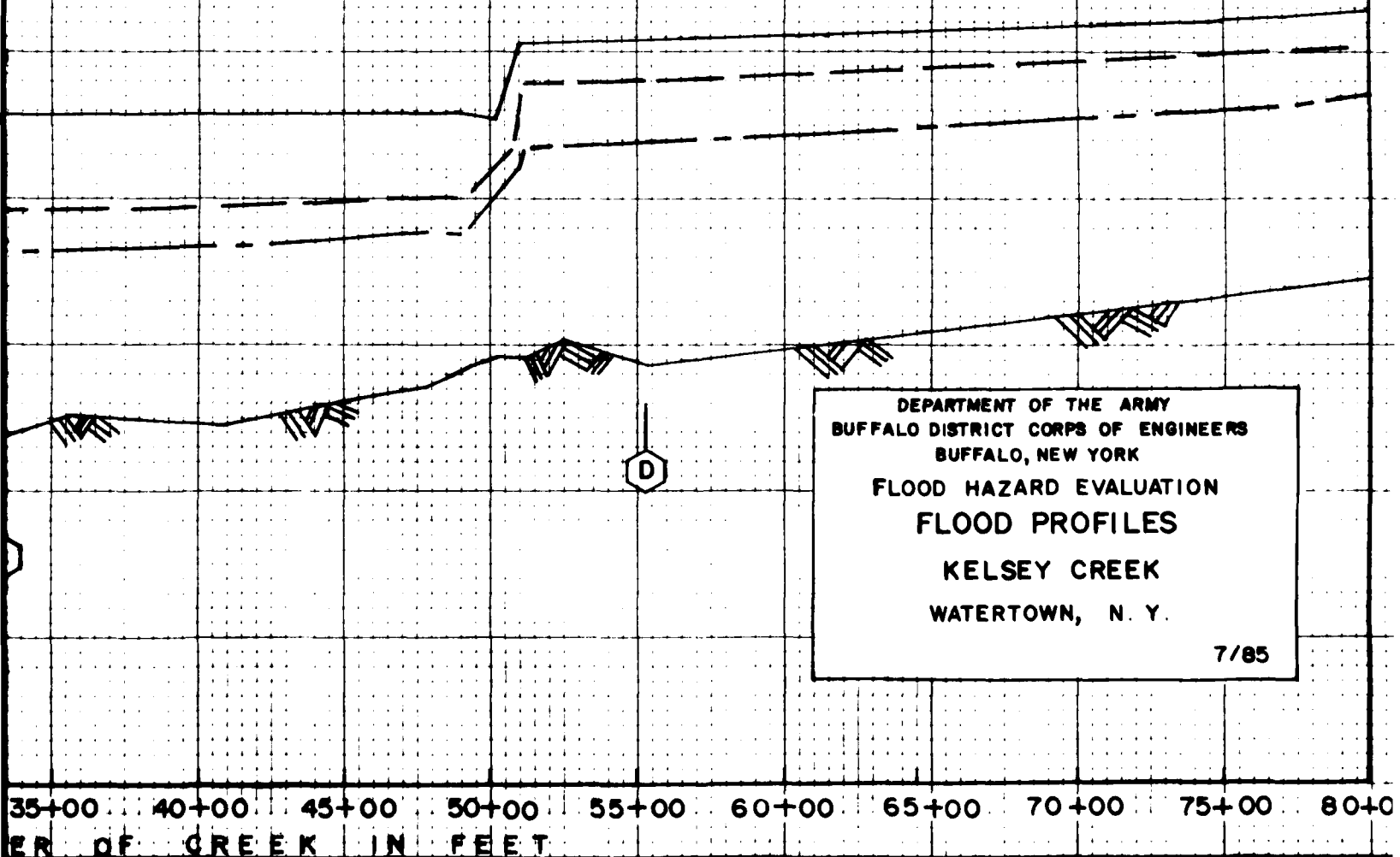
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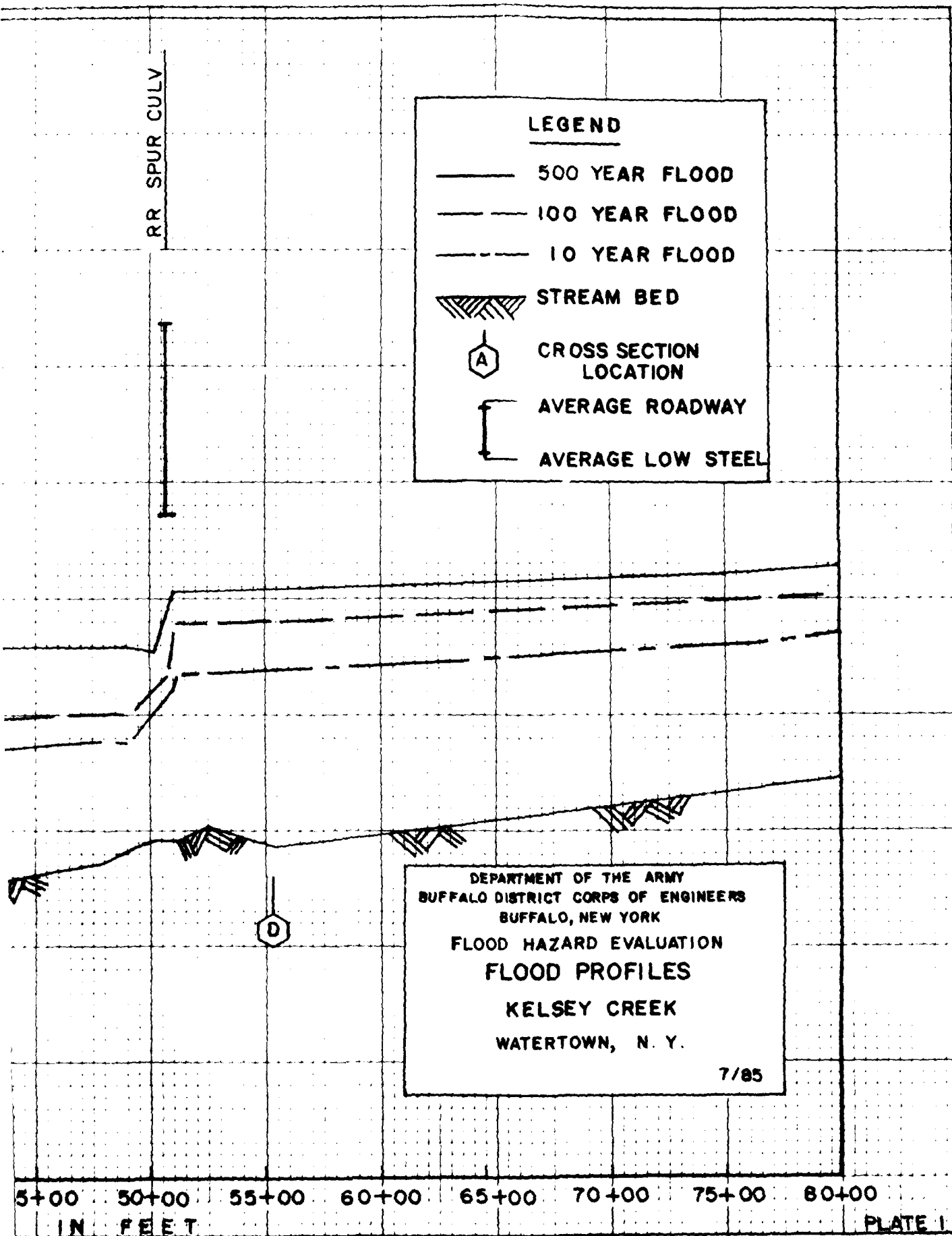
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- 100 YEAR FLOOD
- - - - 10 YEAR FLOOD
-  STREAM BED
-  CROSS SECTION LOCATION
-  AVERAGE ROADWAY
-  AVERAGE LOW STEEL



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FLOOD PROFILES  
KELSEY CREEK  
WATERTOWN, N. Y.

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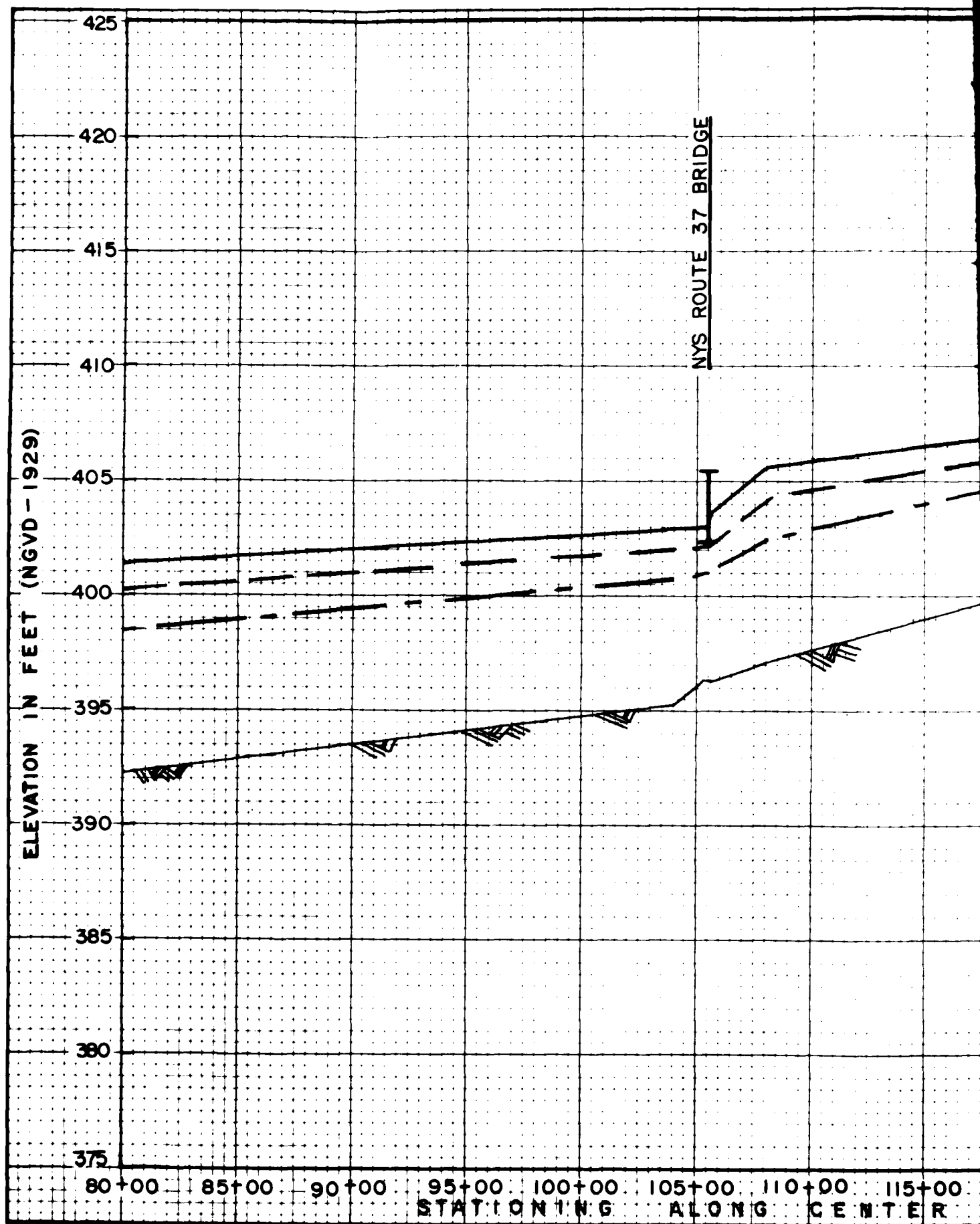
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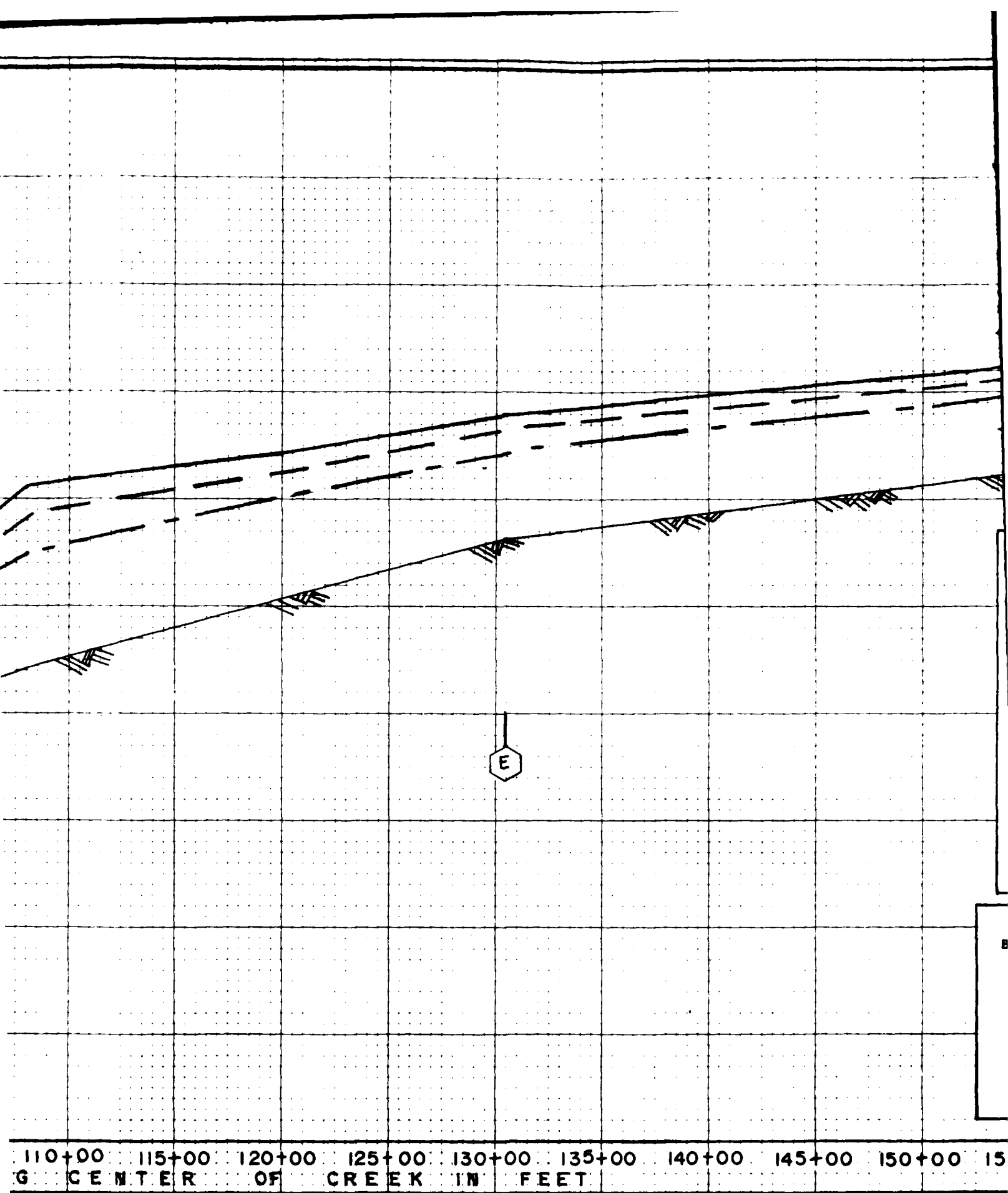


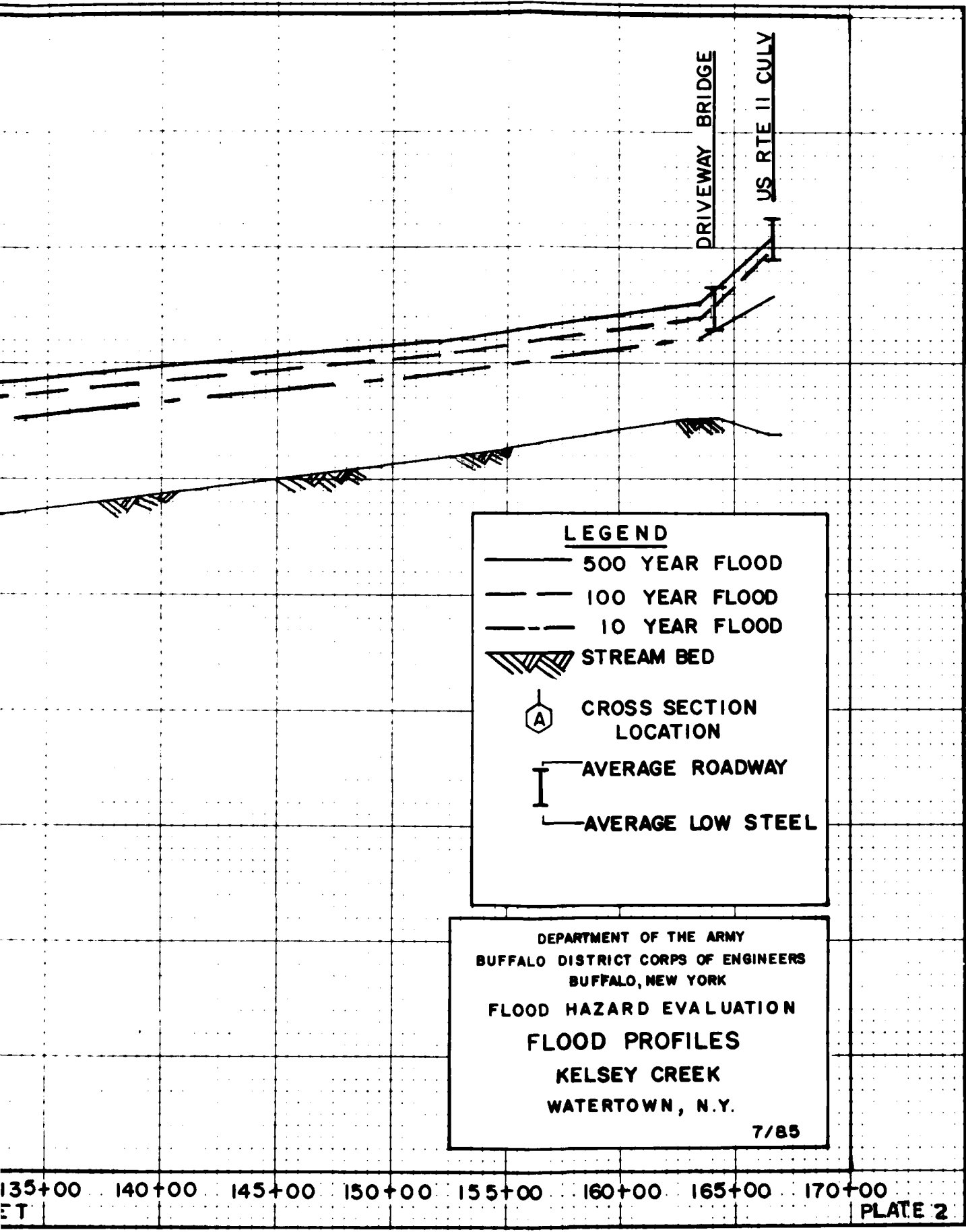
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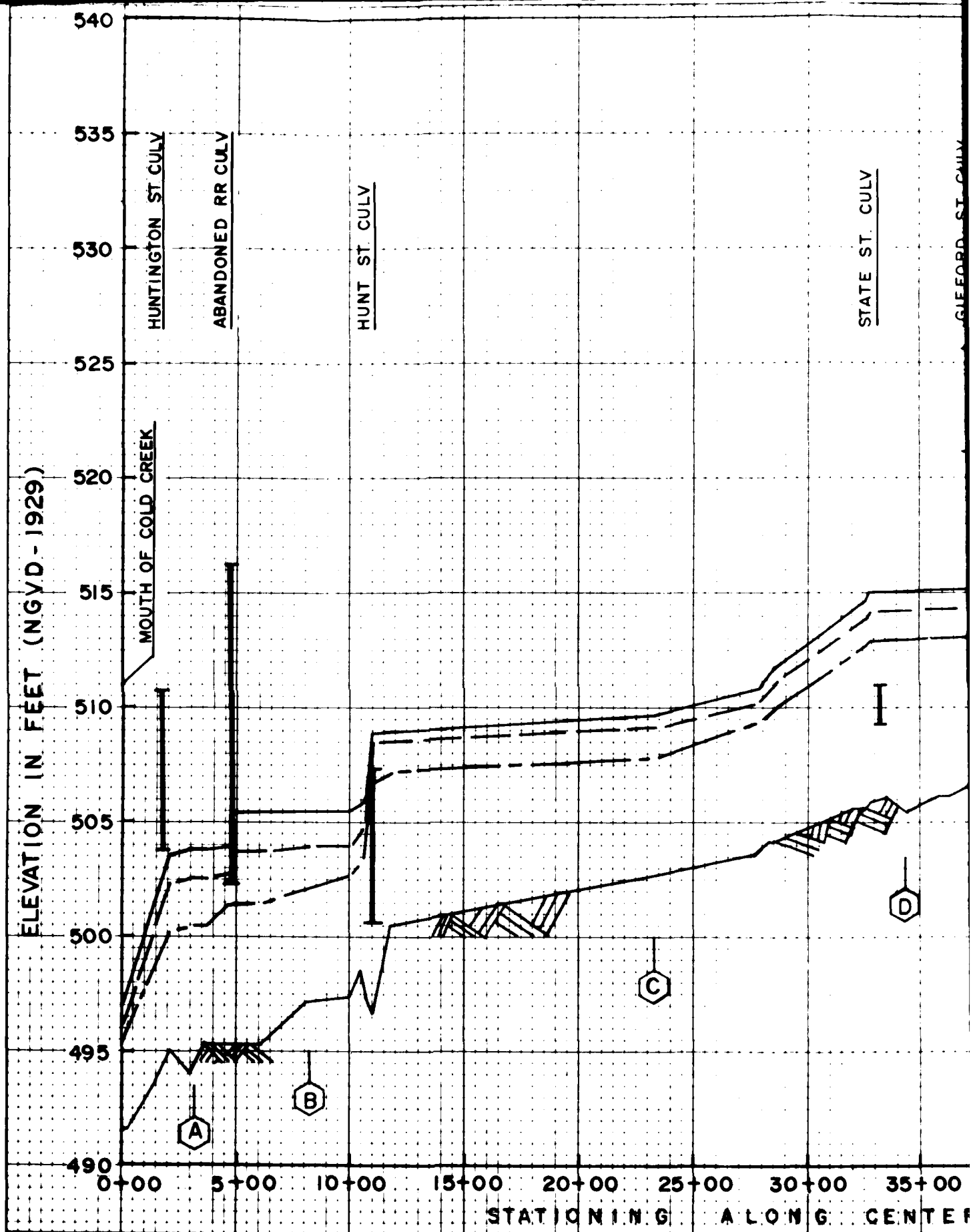


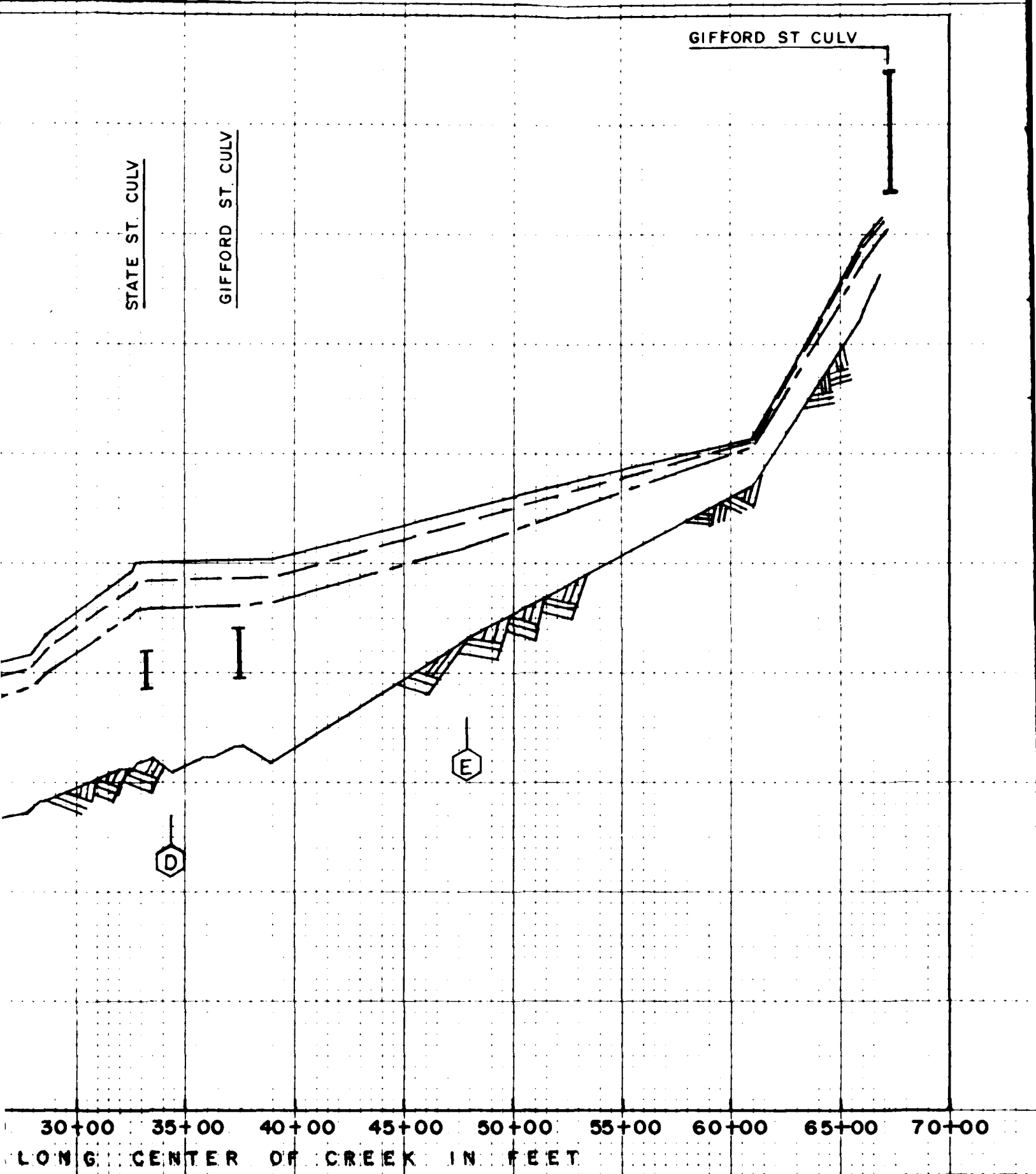


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LEGEND

- 500 YEAR FLOOD
- 100 YEAR FLOOD
- - - 10 YEAR FLOOD



STREAM BED



CROSS SECTION LOCATION



AVERAGE ROADWAY

AVERAGE LOW STEEL

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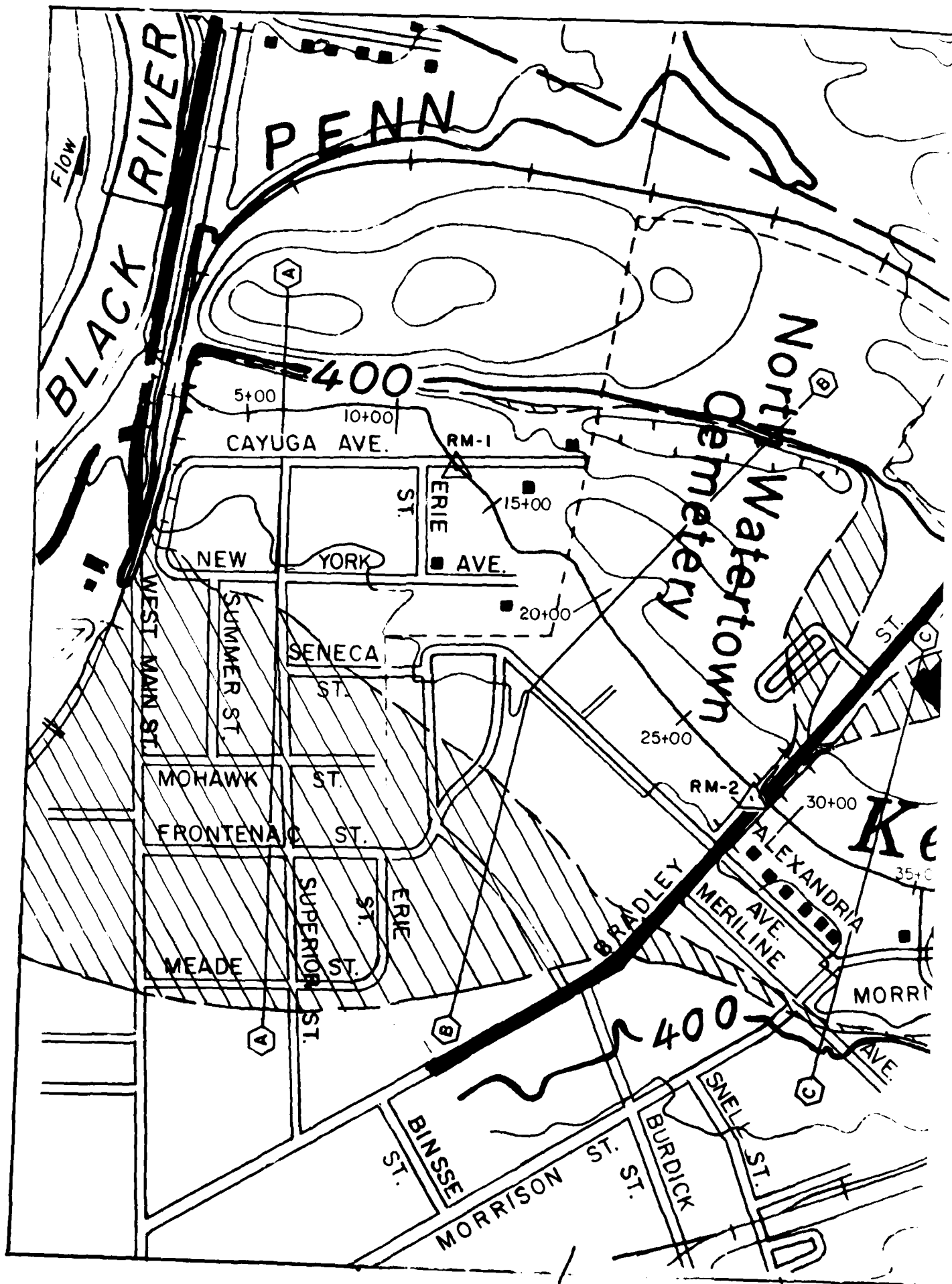
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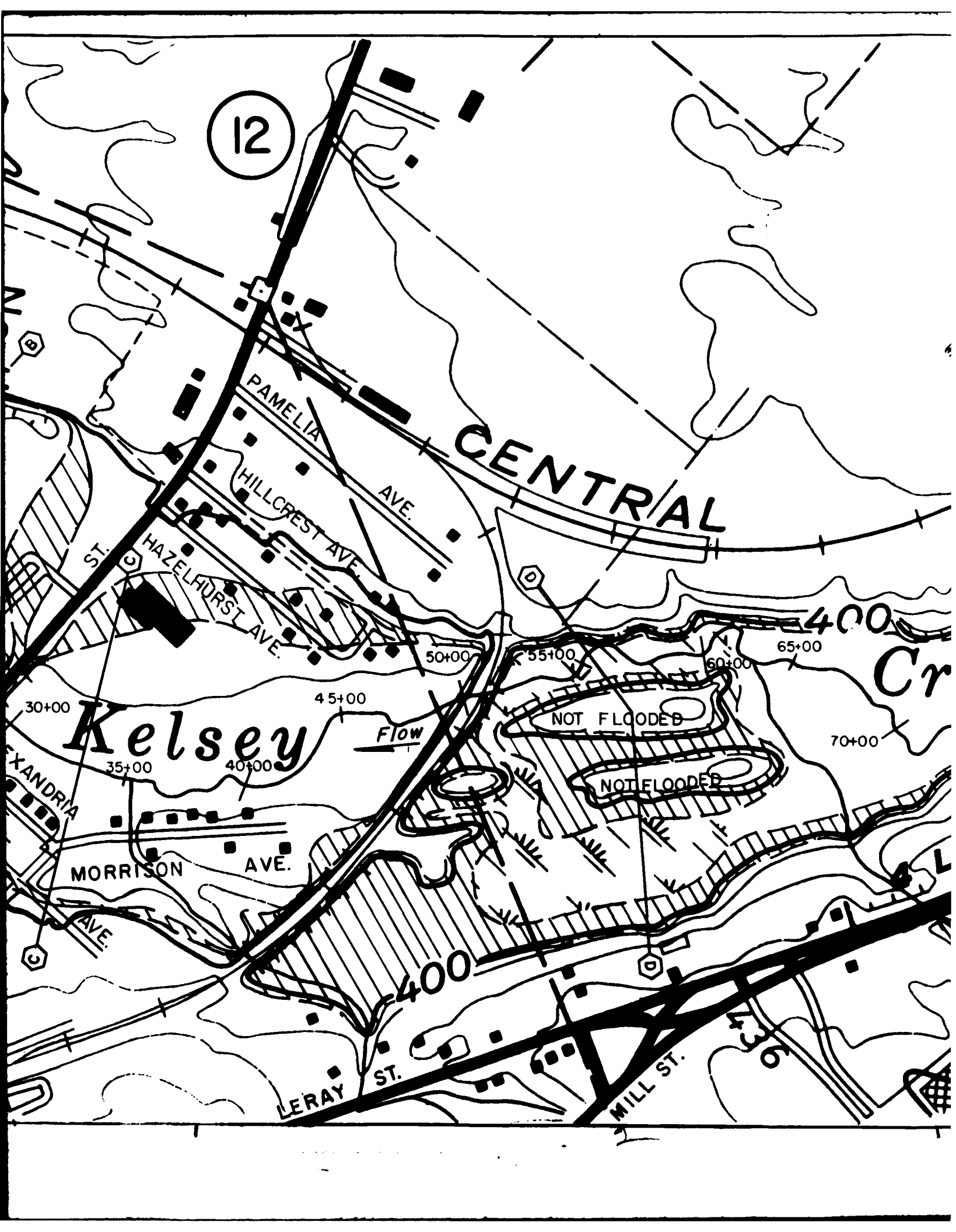
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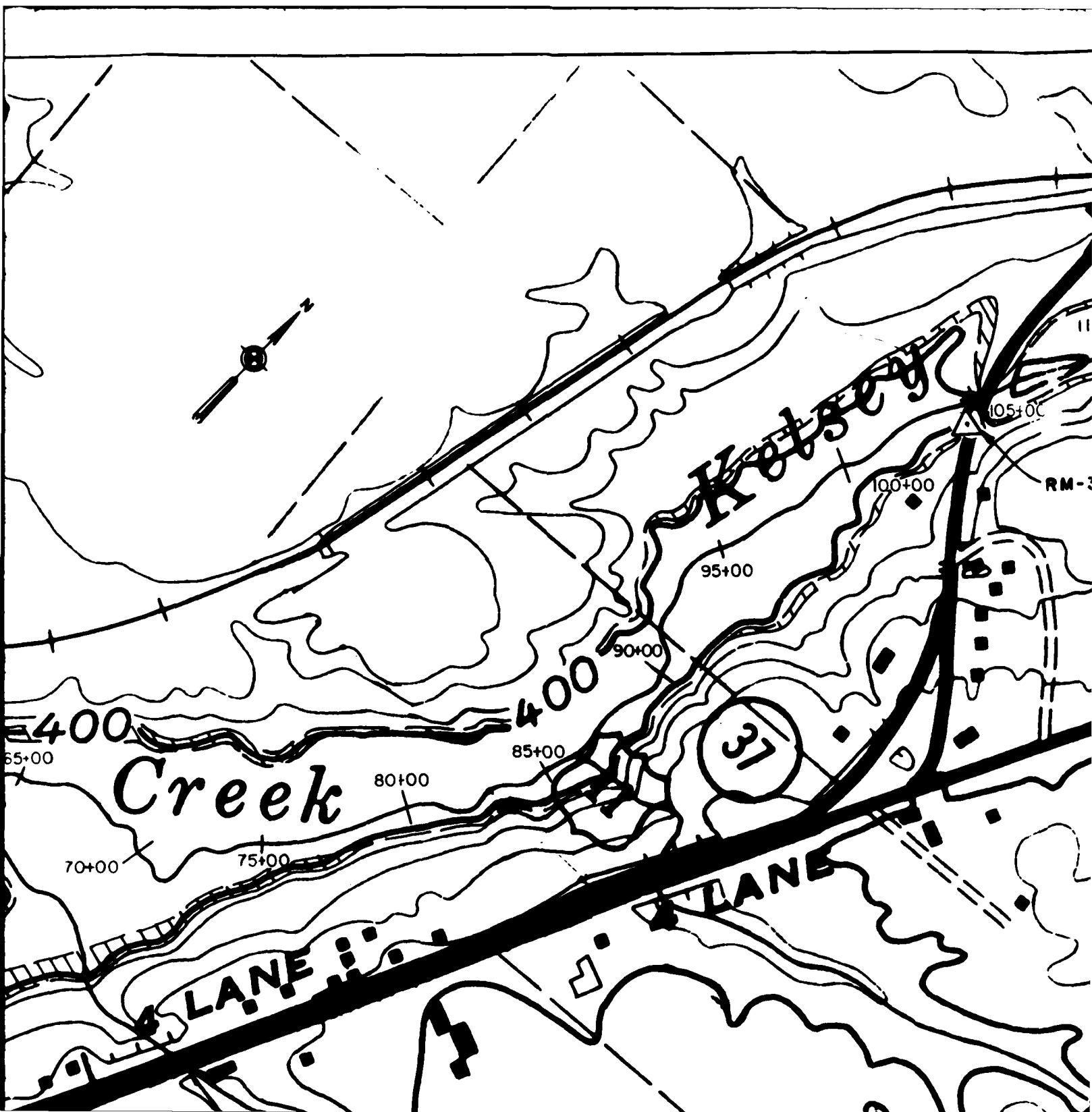
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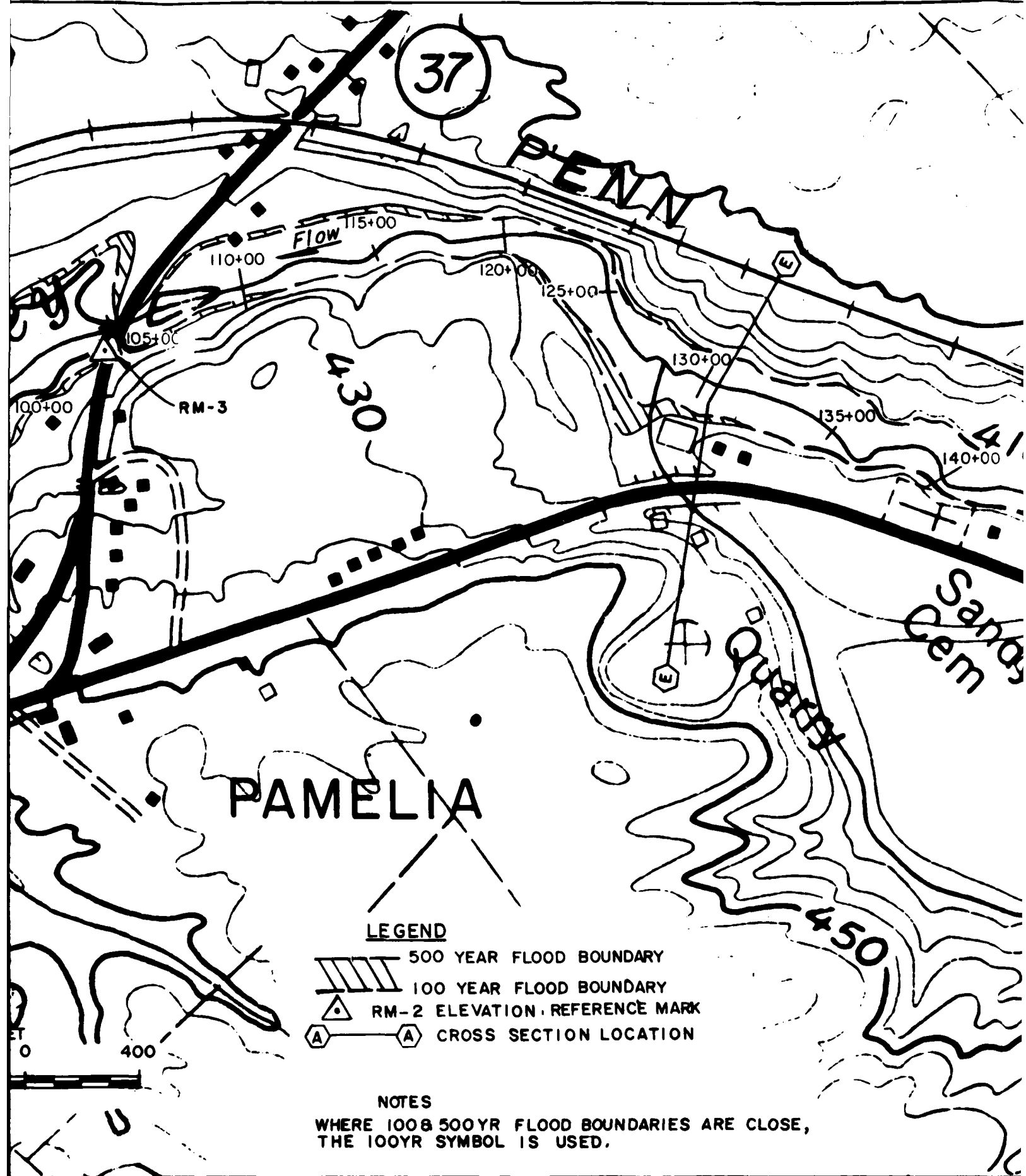
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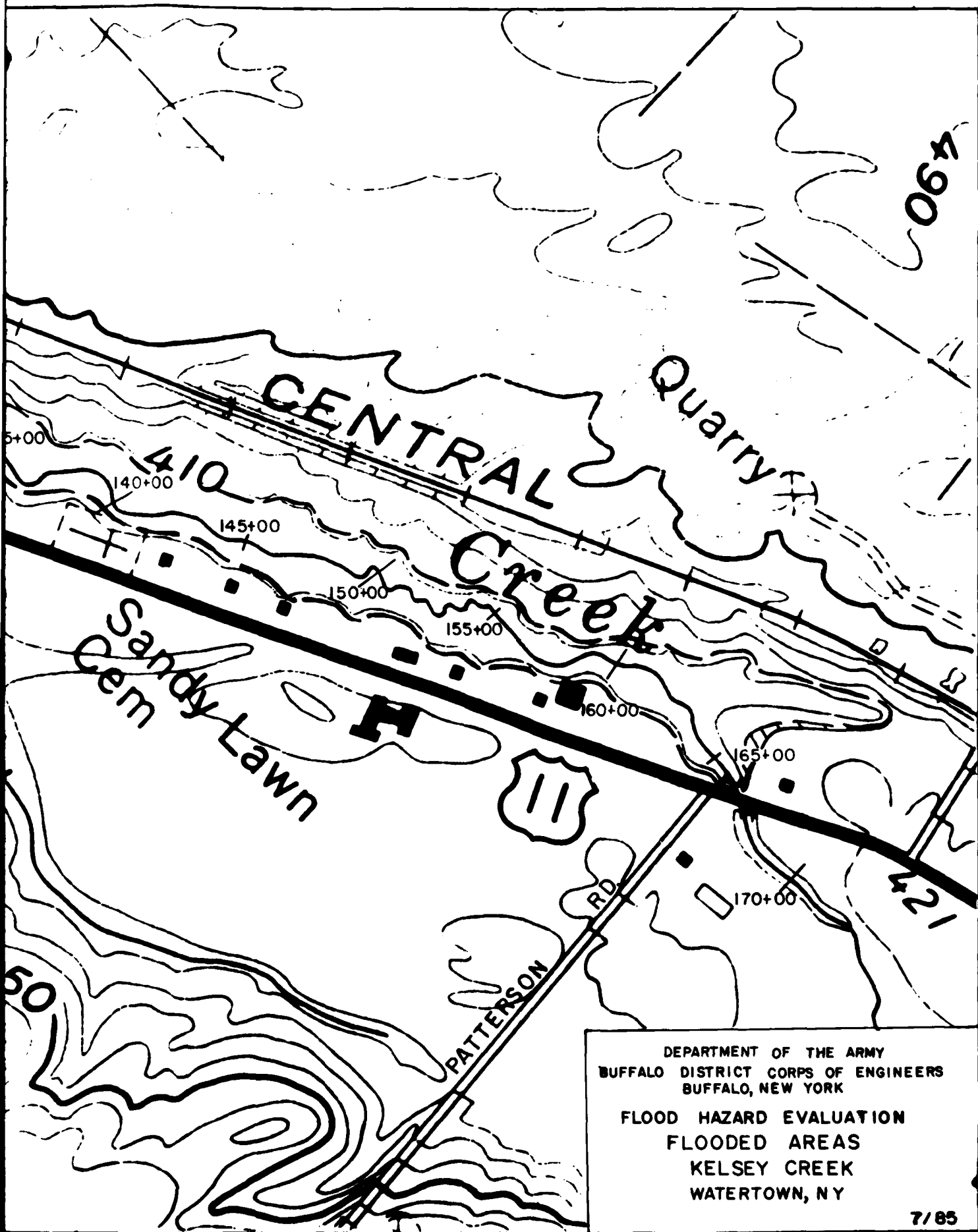
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CENTRAL

Creek

Quarry

Sandy Lawn  
Cem

11

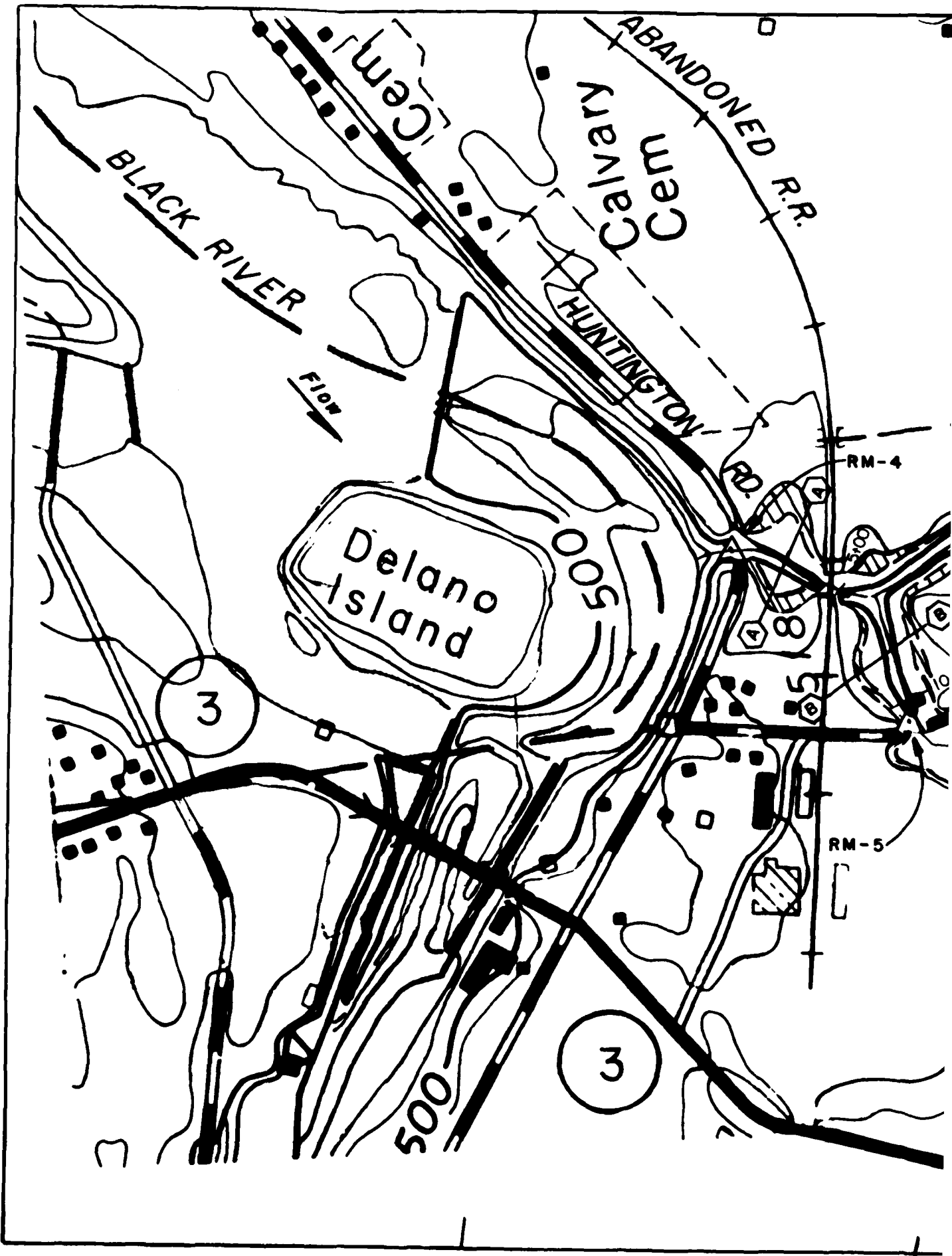
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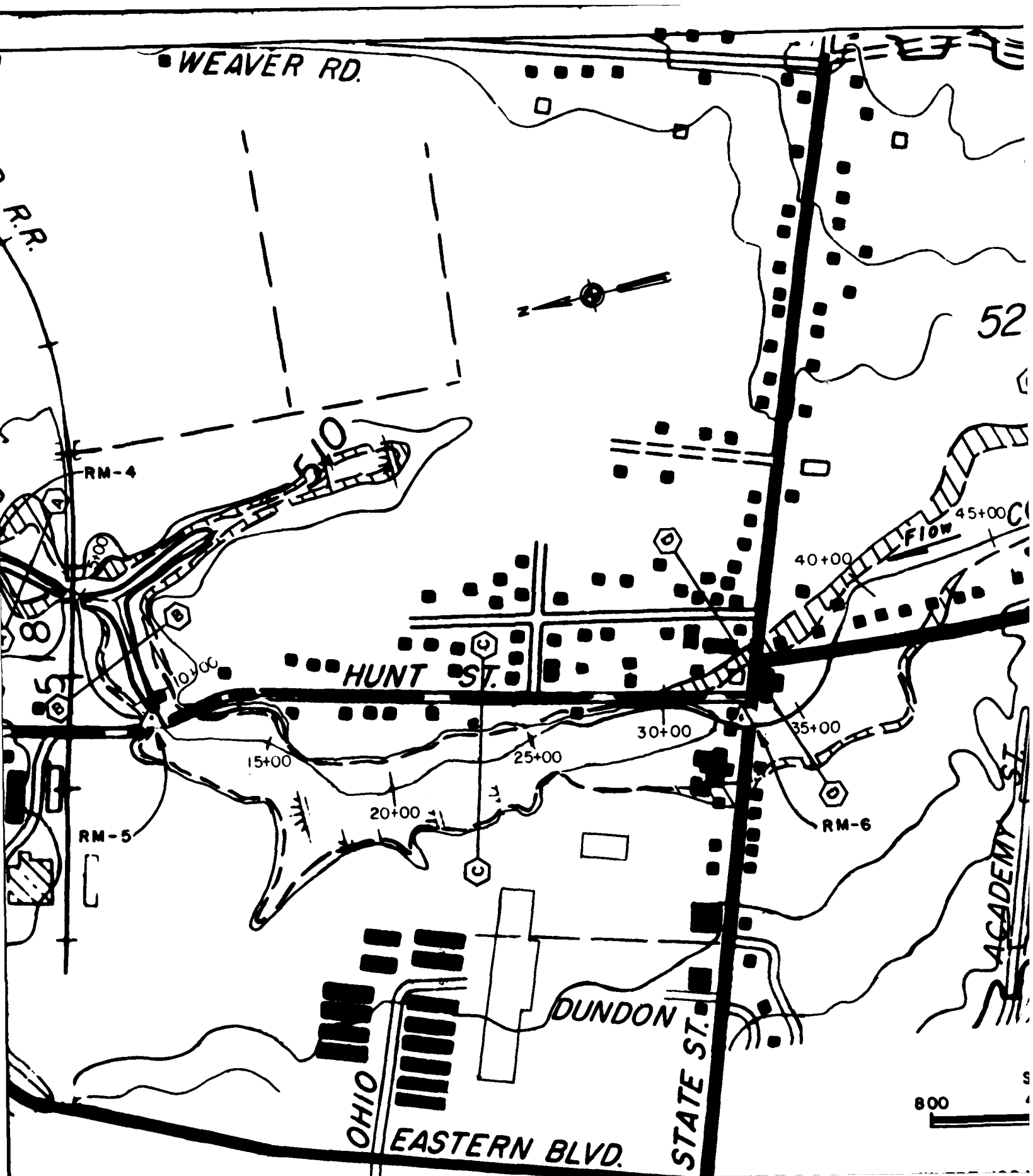
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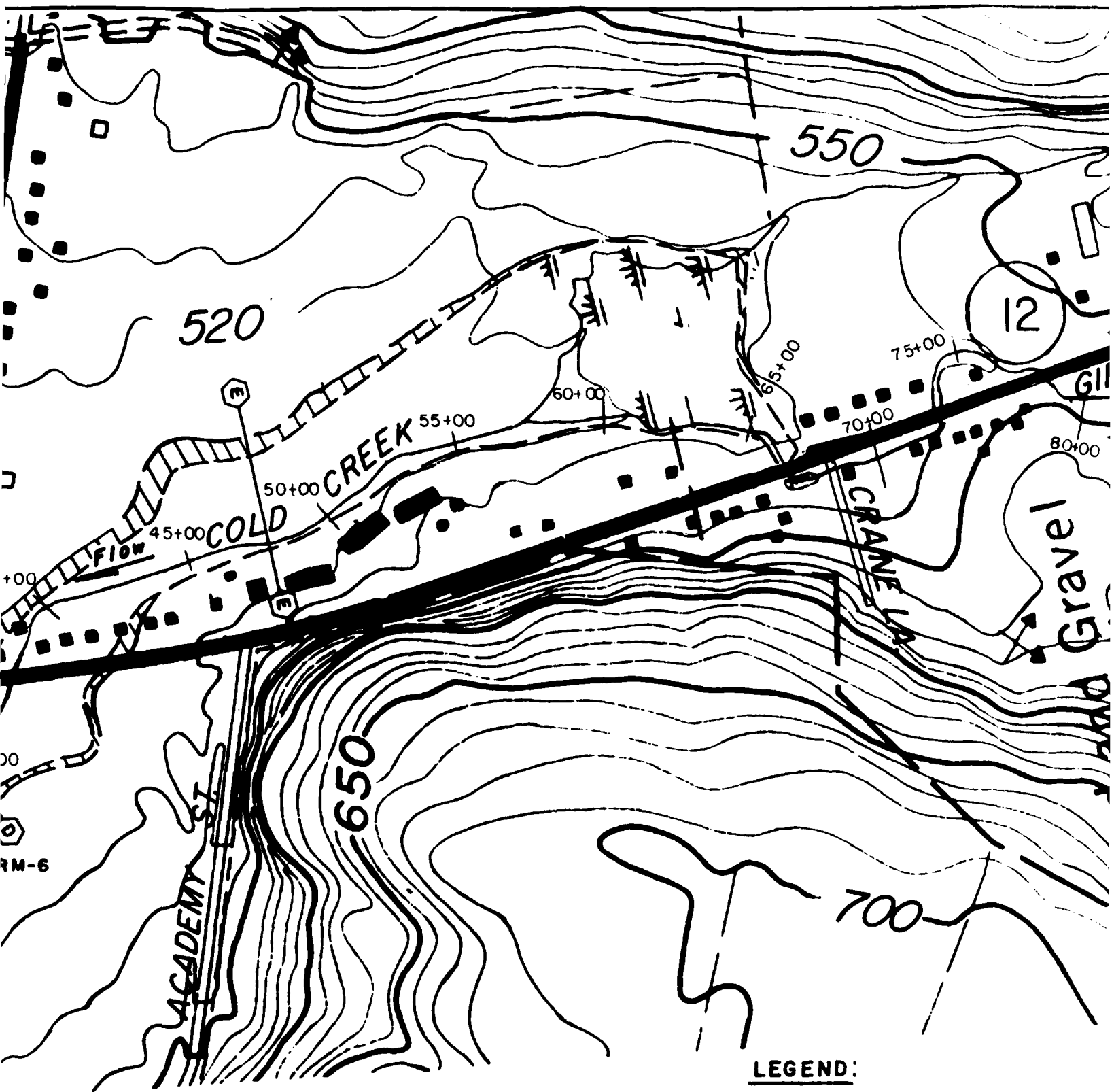
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PLATE 4











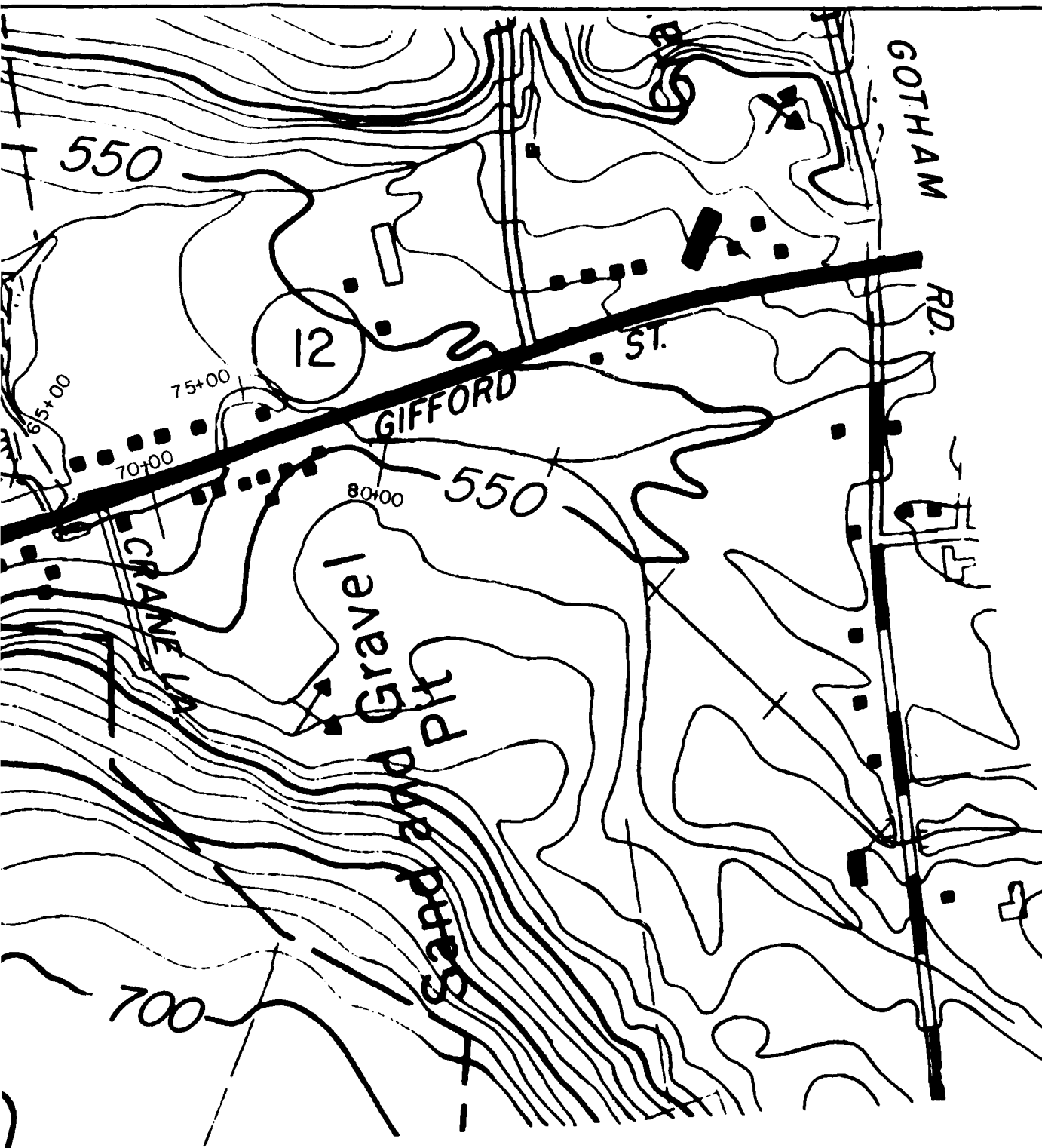


#### NOTES

WHERE 100 YR & 500 YR FLOOD BOUNDARIES ARE CLOSE, THE 100 YR SYMBOL IS USED.

#### LEGEND:

-  500 YEAR FLOOD BOUNDARY
-  100 YEAR FLOOD BOUNDARY
-  RM-4 ELEVATION REFERENCE MARK
-  CROSS SECTION LOCATION



# **LEGEND:**

- 500 YEAR FLOOD BOUNDARY
- 100 YEAR FLOOD BOUNDARY
- ELEVATION REFERENCE MARK
- CROSS SECTION LOCATION

DEPARTMENT OF THE ARMY  
BUFFALO DISTRICT CORPS OF ENGINEERS  
BUFFALO, NEW YORK  
FLOOD HAZARD EVALUATION  
FLOODED AREAS  
COLD CREEK  
WATERTOWN, N.Y.

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PLATE 5

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